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T-428 P02/08 U-551

Applic. No. 10/057,154  
Amdt. dated April 21, 2004  
Reply to Office action of January 21, 2004

Remarks/Arguments:

Reconsideration of the application is requested.

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Claims 1-7 remain in the application.

In the fourth paragraph on page 2 of the Office action, claims 1, 2, and 7 have been rejected as being obvious over Baba (JP 58-164232 A) in view of Kondo et al. (JP 63-99557) (hereinafter "Kondo") under 35 U.S.C. § 103.

As will be explained below, it is believed that the claims were patentable over the cited art in their original form and the claims have, therefore, not been amended to overcome the references.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 1 calls for, *inter alia*:

a buffer layer configured on the metal area, the buffer layer being substantially composed of nickel and having a thickness between 5  $\mu\text{m}$  and 10  $\mu\text{m}$ .

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The Baba reference discloses a semiconductor device with a multi-layer construction. Baba discloses a four-layer construction having a first metal layer (25) formed of a vanadium nickel-chromium alloy, a second metal layer (26) formed of nickel, a third metal layer (27) formed of copper, and a fourth metal layer (28), the material of which is not disclosed in detail. The third metal layer has a thickness of several hundred angstrom units. The fourth metal layer (28) has a thickness of 5000 angstrom units, where 1 angstrom = $1*10^{-10}$  m.

Kondo discloses a multi-layer construction of a barrier layer. The barrier layer is constructed by plating nickel having a thickness of about 10 $\mu$ m. However, there is no motivation to combine the teaching of Kondo with Baba. The 10 $\mu$ m thick nickel layer disclosed in Kondo is at least 20 times thicker than the thickest layer (28) disclosed in Baba. Baba does not include any disclosure regarding a layer thickness of 10 $\mu$ m.

Furthermore, Kondo discloses that the layer (4) is applied directly to a ceramic substrate or to a terminal part (3) of an IC. A metal lead (5) formed of an Fe-Ni-alloy (42 alloy) is connected with the terminal part (3) of the IC with a pure silver solder. Kondo discloses that the solder serves as the buffer layer (page 2, lines 16-21). Therefore, the nickel

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layer (4) of Kondo is not a buffer layer as disclosed in the instant application.

Furthermore, applicants respectfully disagree with the Examiner's comments on pages 2-3 of the Office action, that the nickel buffer layer is applied on a carrier (27) having a metal area, the buffer layer (26) connecting the carrier (27) with a chip (10), which has a rear side metallization layer. The layer (27), which has a thickness of several hundred angstrom units (where 1000 angstrom units = 10nm) cannot be considered a carrier.

Applicants also respectfully disagree with the Examiner's comments on pages 2-3 of the Office action, that the chip is connected with the carrier (27) via a connection medium (17). This is not accurate because the layer (17) includes the four metal layers (25, 26, 27, and 28).

Furthermore, the arguments regarding unexpected results still pertain to the above-noted rejection by the Examiner. Therefore, the Examiner is again directed to page 4, lines 20-23 of the instant application, where it is stated that "it has been shown, surprisingly, that a buffer layer made of nickel and having a thickness between 5  $\mu\text{m}$  and 10  $\mu\text{m}$  greatly increases the stability of the connection between the carrier

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and the chip with respect to temperature fluctuations." As can be seen from the above-noted passage of the specification, the specification contains disclosure of the critical nature of the claimed ranges and unexpected results arising therefrom. Because the instant application discloses unexpected results regarding the buffer layer being substantially composed of nickel and having a thickness between 5  $\mu\text{m}$  and 10  $\mu\text{m}$ , claim 1 is not obvious over Baba in view of Kondo.

Moreover, Baba does not disclose a thickness of the second metal layer (26) formed of nickel. If a person of ordinary skill in the art were to assume that Fig. 4 of Baba is substantially drawn to scale, the second metal layer (26) cannot have a thickness of 10  $\mu\text{m}$ . This is the case because if the third metal layer (27) has a thickness of several hundred angstrom units and the fourth metal (28) layer has a thickness of 5000 angstrom units, the second metal layer (26) would have to be approximately 20 times thicker than the fourth metal layer (28). Because the second metal layer (26) and the fourth metal layer (28) are shown as having approximately the same thickness, a person of ordinary skill in the art would assume that the second metal layer (26) has a thickness of approximately 5000 angstrom units.

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Since claim 1 is believed to be allowable dependent claims 2 and 7 are believed to be allowable as well.

Even though claim 2 is believed to be allowable, the following remarks are given. Applicants respectfully disagree with the Examiner's comment on page 3 of the Office action that the combination with Kondo's buffer layer has a thickness between 7 and 9 micrometers. Kondo discloses a thickness of about 10 micrometers for the thickness of the barrier layer (4). Accordingly, about 10 micrometers is not in the range between 7 and 9 micrometers. Therefore, it is respectfully believed that the Examiner is in error.

In the sixth paragraph on page 3 of the Office action, claims 3, 4, and 6 have been rejected as being obvious over Baba (JP 58-164232 A) in view of Kondo et al. (JP-99557) (hereinafter "Kondo") and further in view of Schneegans et al. (U.S Patent No. 5,901,901) (hereinafter "Schneegans") under 35 U.S.C. § 103. Schneegans does not make up for the deficiencies of Baba and Kondo. Since claim 1 is believed to be allowable, dependent claims 3, 4, and 6 are believed to be allowable as well.

It is appreciatively noted from page 4 of the Office action, that claim 5 would be allowable if rewritten in independent

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form including all of the limitations of the base claim and any intervening claims. The claims have not been amended as indicated by the Examiner, as the claims are believed to be patentable in their existing form.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1. Claim 1 is, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent on claim 1, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 1-7 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel respectfully requests a telephone call so that, if possible, patentable language can be worked out.

If an extension of time for this paper is required, petition for extension is herewith made.